

IN THE CLAIMS:**1-3. Canceled**

4. (Previously Presented) A method for fabricating an ultra-shallow surface channel MOS transistor, the method comprising:
forming CMOS source and drain regions, and an intervening well region with a surface;
depositing a surface channel on the surface overlying the well region;
forming a high-k dielectric overlying the surface channel;
depositing a placeholder material overlying the surface channel;
conformally depositing oxide;
etching the placeholder material to form a gate region overlying the surface channel; and,
forming a gate electrode overlying the high-k dielectric in the gate region.

5. (Original) The method of claim 4 further comprising:

following the deposition of the placeholder material, lightly doped drain (LDD) processing the source and drain regions;
wherein forming a high-k dielectric insulator overlying the surface channel includes depositing the high-k dielectric prior to the deposition of the placeholder material;

the method further comprising:
forming sidewall insulators adjacent the surface channel,
high-k dielectric insulator, and gate region; and,
heavy ion implanting and activating the source and drain
regions.

6. (Original) The method of claim 4 further
comprising:

prior to the deposition of the surface channel, lightly doped
drain (LDD) processing the source and drain regions;
heavy ion implanting and activating the source and drain
regions; and,

wherein forming a high-k dielectric insulator overlying the
surface channel includes depositing the high-k dielectric following the
etching of the placeholder material to form the gate region.

7. (Previously Presented) A method for fabricating an
ultra-shallow surface channel MOS transistor, the method comprising:

forming CMOS source and drain regions, and an intervening
well region with a surface;

depositing a metal oxide surface channel on the surface
overlying the well region having a thickness in the range in the range of
10 to 20 nanometers (nm);

forming a high-k dielectric overlying the surface channel;
and,

forming a gate electrode overlying the high-k dielectric.

8. (Previously Presented) A method for fabricating an ultra-shallow surface channel MOS transistor, the method comprising:

forming CMOS source and drain regions, and an intervening well region with a surface;

depositing a metal oxide surface channel on the surface overlying the well region having a resistivity in the range between 0.1 and 1000 ohm-cm;

forming a high-k dielectric overlying the surface channel;

and,

forming a gate electrode overlying the high-k dielectric.

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11. (Original) The method of claim 4 wherein depositing a placeholder material overlying the surface channel includes forming placeholder material to a first thickness with a placeholder material surface; and,

wherein conformally depositing oxide includes depositing oxide to a second thickness in the range of 1.2 to 1.5 times the first thickness; and,

the method further comprising:

chemical mechanical polishing (CMP) the oxide to the level of the placeholder material surface.

12. (Original) The method of claim 5 wherein forming sidewall insulators adjacent the surface channel, high-k dielectric

insulator, and gate region includes forming sidewalls from a material selected from the group including Si₃N₄ and Al₂O₃.

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16. (Previously Presented) An ultra-shallow surface channel MOS transistor, the transistor comprising:

a source region;
a drain region;
a well region intervening between the source and drain with a surface;
a surface channel overlying the well region;
a high-k dielectric insulator overlying the surface channel;
a placeholder overlying the surface channel, forming a temporary gate region; and,
a gate electrode overlying the high-k dielectric layer, formed in the gate region.

17. (Original) The transistor of claim 16 wherein the placeholder is temporarily formed directly overlying the high-k dielectric insulator;

the transistor further comprising:
sidewall insulators adjacent the surface channel, high-k dielectric insulator, and the gate region.

18. (Original) The transistor of claim 16 wherein the placeholder is temporarily formed directly overlying the surface channel.

19. (Previously Presented) An ultra-shallow surface channel MOS transistor, the transistor comprising:

a source region;
a drain region;
a well region intervening between the source and drain with a surface;

a metal oxide surface channel overlying the well region having a thickness in the range in the range of 10 to 20 nanometers (nm);

a high-k dielectric insulator overlying the surface channel; and

a gate electrode overlying the high-k dielectric layer.

20. (Previously Presented) An ultra-shallow surface channel MOS transistor, the transistor comprising:

a source region;
a drain region;
a well region intervening between the source and drain with a surface;

a metal oxide surface channel overlying the well region having a resistivity in the range between 0.1 and 1000 ohm-cm;

a high-k dielectric insulator overlying the surface channel; and

a gate electrode overlying the high-k dielectric layer.

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23. (Original) The transistor of claim 17 wherein the sidewall insulators are a material selected from the group including Si₃N₄ and Al₂O₃.

24. (Previously Presented) A method for fabricating an ultra-shallow surface channel MOS transistor, the method comprising:

- forming CMOS source and drain regions, and an intervening well region with a surface;
- depositing a metal oxide surface channel on the surface overlying the well region;
- forming a high-k dielectric; and,
- forming a gate electrode overlying the high-k dielectric.